

REMARKS

This communication is in response to the first Office Action dated July 19, 2005. In that Office Action, the Examiner rejected Claims 1-16 and 20 as failing to comply with the written description requirement, noting that there is no discussion of a "depletion mode MOSFET." The Examiner also rejected Claims 1-20 as being anticipated or obvious over U.S. Patent No. 6,180,969 to Yang et al.

In response, applicants have cancelled Claims 4, 6, and 9-20. Applicants have also added new Claims 21-23. Further, applicants have amended Claims 1, 7, and 8 to remove the reference to "MOSFET", and replaced it with "NMOS transistor" or "PMOS transistor". Support for this language can be found on page 4, first paragraph, of the specification. Therefore, applicants respectfully traverse this rejection.

Turning to the rejection of the claims based upon the Yang patent, applicants have substantially amended Claim 1 to recite patentable subject matter. Specifically, Claim 1 has been amended to indicate that the pixel sensor cell is formed on an integrated circuit that has **a negative voltage generator that can completely turn off the transfer transistor** such that charge from the photodiode can not flow to the output node. This new limitation is not fairly taught in the Yang patent.

While applicants concede that the Yang patent teaches the use of a depletion mode transfer transistor for a pixel sensor cell, the transfer transistor has zero volts applied to the gate during turn off. See Column 9, lines 9-14. In other words, there is no indication in the Yang patent that a negative voltage is required; therefore, there would be no need for a negative voltage generator. As set forth in the Yang patent at column 9, line 11, 0 volts is applied to the gate of the transfer transistor. The reason why a depletion mode transistor is used in Yang is to **allow for some current flow between the photodiode and the floating sensing node**. This is explicitly stated in the Yang patent as aiding in the "blooming" problem. Specifically, at column 9, lines 1-15, the Yang patent reads:

The characteristics of the native depletion mode transistor are effectively used in the transfer transistor of the present invention. For example, when the charge capacity of the photodiode is reached, excess photoelectric charges will overflow the photodiode and be collected by neighboring pixels. The resulting crosstalk from an intense light source in an image is called "blooming."

As illustrated in the present invention, in the case where the native transfer transistor is a depletion mode is used [sic], although zero volts is applied to the gate of the native transfer transistor, current can flow because of the increased potential difference between the low voltage photodiode and the floating sense node, thereby removing the "blooming."

Thus, Yang does not contemplate any need for a negative voltage and thus, there is no teaching in Yang to include a negative voltage generator that is on the same integrated circuit die as the pixel sensor cell. For this reason, Claim 1 as amended is allowable over the prior art.

In addition, Claim 5 has been amended to indicate that the negative voltage generator generates a $-V_{dd}$ voltage that will completely turn off the transfer transistor. This allows the voltage swing for the transfer transistor to move from $-V_{dd}$ to V_{dd} . This limitation is not fairly taught in the Yang patent, and therefore Claim 5 is allowable over the cited prior art.

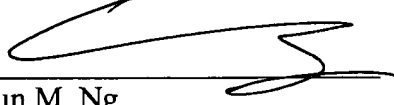
Additionally, Claims 21-23 relate to a method of operating an active pixel where the transfer transistor is held at a negative voltage such that the transfer transistor is completely off. There is no indication in the Yang patent to apply a negative voltage to the depletion mode transistor. At most, the depletion mode transistor is held at zero volts. Claims 22 and 23 detail that the transfer transistor is turned on and off by negative rail voltage $-V_{dd}$ and positive rail voltage V_{dd} . This is not fairly shown in the Yang patent. For these reasons, Claims 21-23 are allowable over the prior art.

In view of the above amendment, applicants believe the pending application is in condition for allowance. Applicants believe no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 50-0665, under Order No. 384938064US from which the undersigned is authorized to draw.

Dated:

8/25/05

Respectfully submitted,

By 

Chun M. Ng

Registration No.: 36,878
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant